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water; if they have equal holes in the bases, respectively, how many times as long will it take the cylinder to empty as the cone ?

*** Solutions of these problems should be sent to B. F. Finkel not later than January 10.

DIOPHANTINE ANALYSIS.

76. **Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.**

It is required to find four positive numbers, such that if each be diminished by twice the cube of their sum the four remainders will be rational cubes.

77. **Proposed by JOHN M. COLAW, A. M., Monterey, Va.**

Find (1) three consecutive numbers whose sum is a cube, and (2) three consecutive numbers the sum of whose cubes is a cube.

*** Solutions of these problems should be sent to J. M. Colaw not later than January 10.

MISCELLANEOUS.

70. **Proposed by WALTER H. DRANE, Graduate Student, Harvard University, 65 Hammond Street, Cambridge, Mass.**

$$\text{Prove } \tan^{-1}x=\frac{1}{2i}\left(\log\frac{x-i}{x+i}\right), \text{ and thence that } \pi=(2/i)\log(i).$$

71. **Proposed by GUY B. COLLIER, 1901 Union, 27 Middle Section of South College, Schenectady, N. Y.**

Find the locus of any point on the front sprocket of a bicycle during one revolution of the hind wheel (any gear may be assumed).

*** Solutions of these problems should be sent to J. M. Colaw not later than January 10.

EDITORIALS.

Dr. Halsted reports that the Sylvester Fund has just been finished with about £900.

A copy each of the July number, Vol. II., and the July number, Vol. X., of the *Analyst* is wanted. Any one who can furnish these should write to the editor of the MONTHLY.

A number of important articles will appear in the MONTHLY during the next year. Dr. Miller will continue to furnish original matter on the all-embracing subject of Groups ; Dr. E. O. Lovett will continue his series of articles on Lie's Transformation Groups ; Dr. Roe has sent in a valuable article on Symmetric Functions, and Dr. Halsted has furnished a highly valuable account of the great Russian mathematician, Tchébychev. This biography will appear accompanied by an admirable picture of Tchébychev.

Nos. 6 and 11, of Vol. II. of the MONTHLY are exhausted. As we have yet a few orders for complete sets to fill, we shall be pleased to pay 40 cents apiece for copies of No. 6, Vol. II., and 30 cents apiece for copies of No. 11. There has been, of late, quite a demand for complete sets for College and University libraries. Whenever a sufficient number of orders are received to defray the expenses these numbers will be reprinted. Other numbers in other volumes of the MONTHLY are nearly exhausted. Subscribers desiring numbers to complete their files should order them at once.

In order to increase our subscription list for next year, we will allow each old subscriber who secures one new subscriber to remit us three dollars in full payment for one year's subscription to the MONTHLY for both.

BOOKS AND PERIODICALS.

Lectures on Elementary Mathematics. By Joseph Louis Lagrange. Being a course of lectures delivered at the École Normale, Paris, 1795. Translated from the French by Thomas J. McCormack. 8vo. Handsomely bound in Red Cloth. xvi+156 pages. Price, $1.00. Chicago: The Open Court Publishing Co.

In bringing out this valuable translation, the translator deserves great praise. These lectures which were delivered in 1795 and which are now found in the 7th volume of Lagrange's collected works have never before been published in separate form either in French or English, though a translation in German by Niedermüller appeared in 1880. These lectures are the source from which many of the best discussions of elementary mathematics have been drawn, besides containing much of great value and interest not yet incorporated in the text books. These lectures have received the indorsement of De Morgan, and Dühaing places them in the front rank of elementary expositions, as an exemplar of their kind.

The lectures discuss the theory of *Continued Fractions*, *Logarithms*, the *Operations of Arithmetic*, and fundamental principles generally. A brief *history of Algebra* is given and a full discussion of *equations of the third and fourth degree*, including the irreducible case. The two final lectures are devoted to the resolution of numerical equations, and to the usage of curves in the solution of problems.

Teachers of elementary mathematics, who desire to improve their methods of instruction, adding richness and vitality to the subject, should read this book. B. F. F.

A Manual of Experiments in Physics. Laboratory Instruction for College Classes. By Joseph S. Ames, Ph. D., Associate Professor of Physics in Johns Hopkins University, and William J. A. Bliss, Ph. D., Associate in Physics in Johns Hopkins University. 8vo. Cloth. 544 pages. New York: Harper & Brothers.

To my mind, this is by far the best laboratory manual that has appeared. B. F. F.

Elements of the Differential Calculus. By James McMahon, A. M. (Dublin), Assistant Professor of Mathematics in Cornell University, and Virgil Sny-